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# (12) UK Patent Application (19) GB (11) 2 259 688 (13) A

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B8E E1C

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UK CL (Edition K) B8E E1C

INT CL<sup>5</sup> B60P 1/30 1/32 1/34

(54) Combined car carrier and dumper truck

(57) A vehicle having a support deck (4) adapted to slide relative to an elongate body portion (7) or sub-frame is provided with first means (9) for pivoting the body portion (7) in a vertical plane relative to a rear pivot axis (8) and second means for effecting movement of the deck (4) longitudinally of the body portion (7). The sub-frame (7) has a pivot point (8) and when locked with the support deck acts as a dumper truck. The deck preferably slides in end channels of the sub-frame.

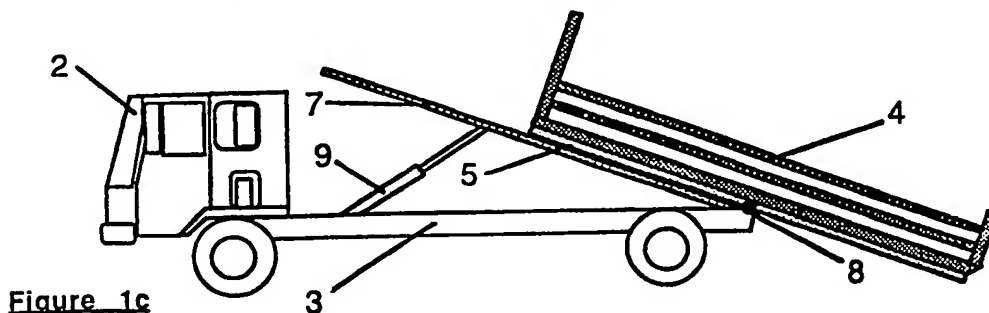


Figure 1c

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

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# FIGURE 1

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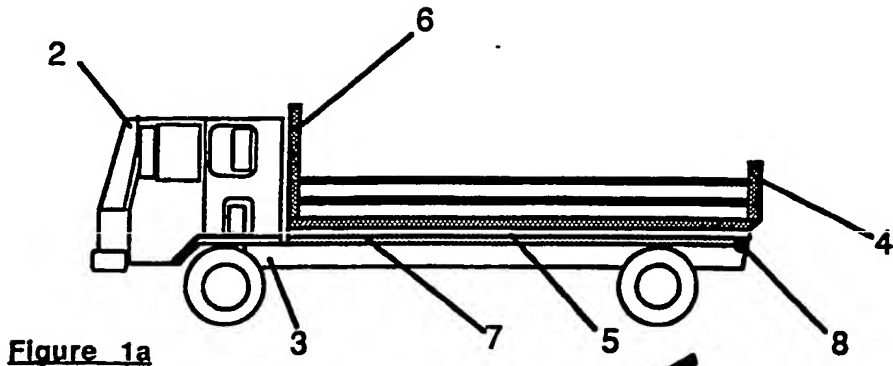


Figure 1a

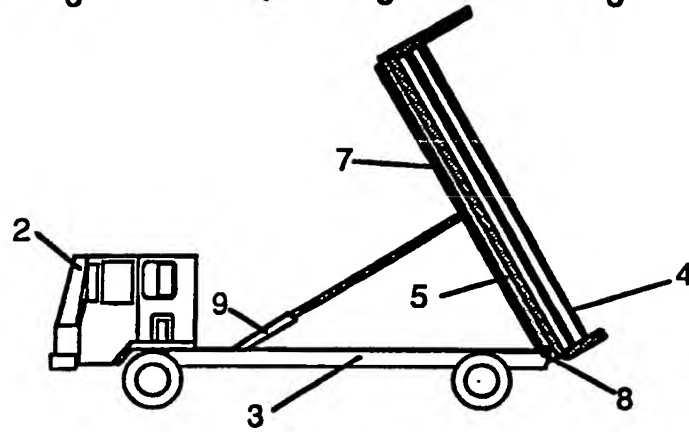


Figure 1b

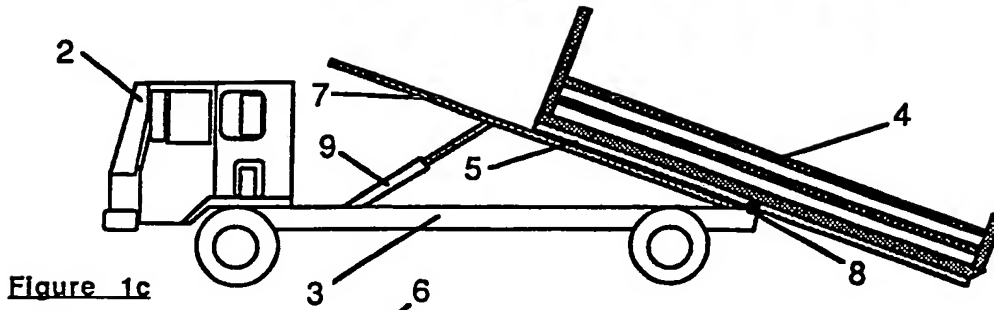


Figure 1c

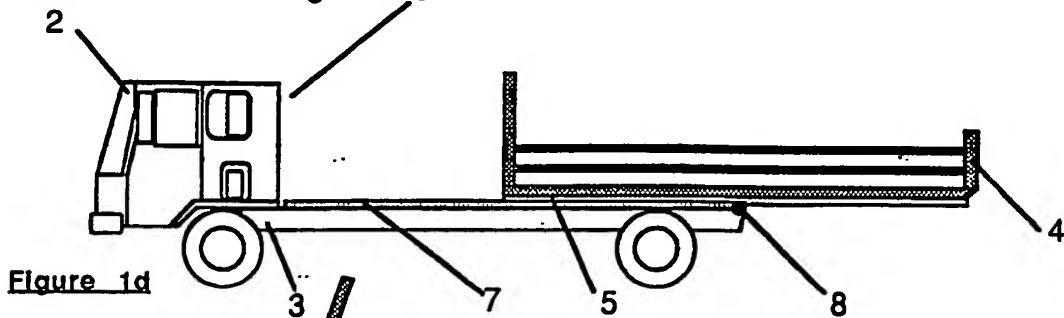


Figure 1d

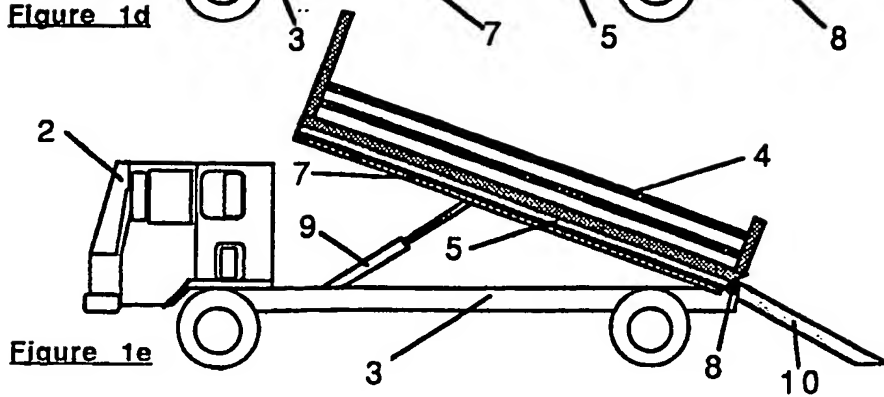
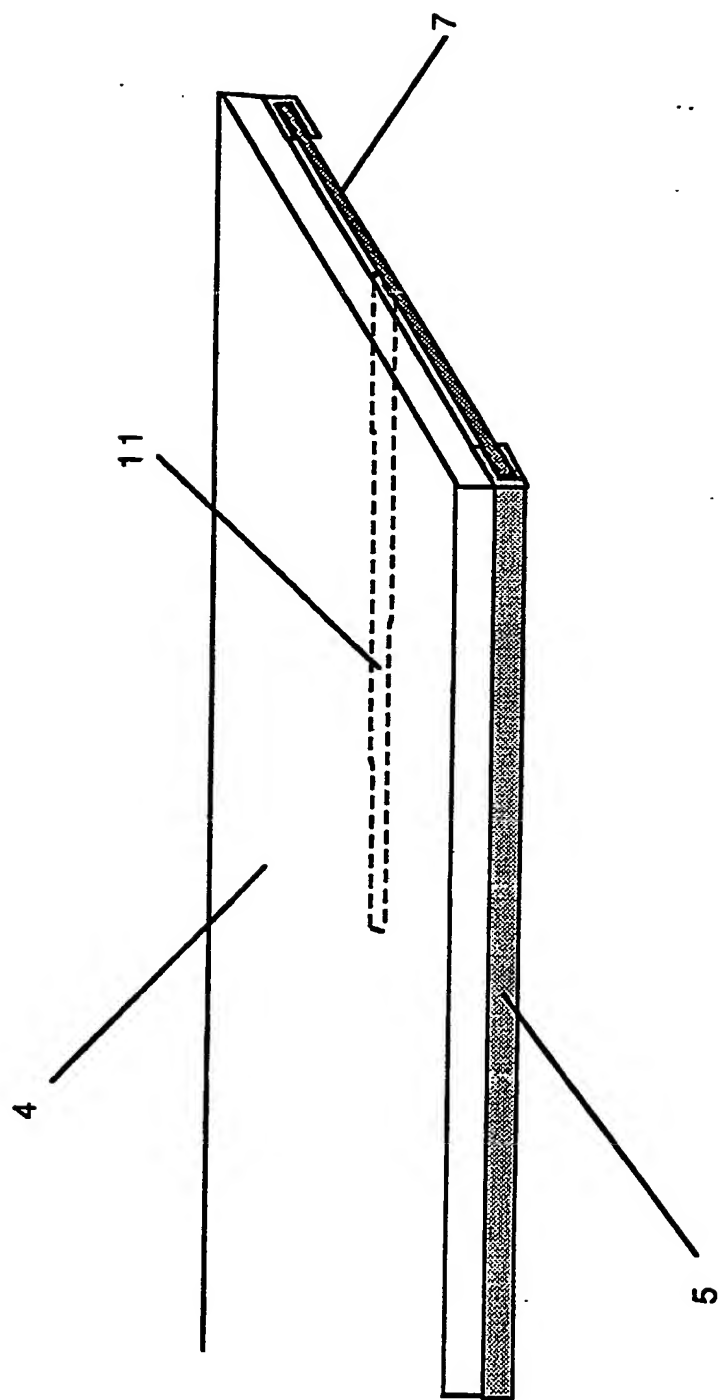
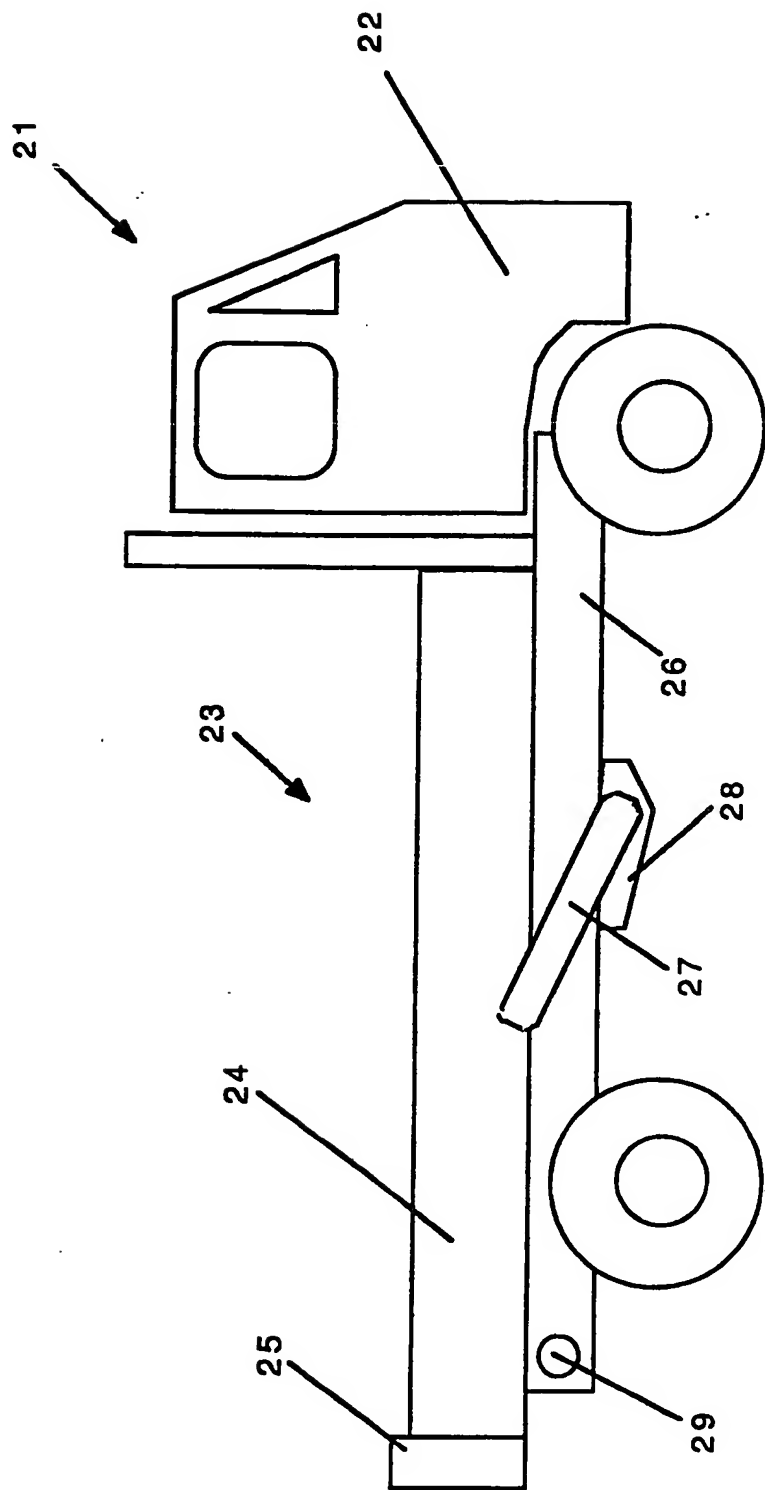


Figure 1e



**FIGURE 2**

**FIGURE 3**



## IMPROVEMENTS AND MODIFICATIONS TO VEHICLE CHASSIS

This invention relates to improvements and modifications to vehicle chassis.

Reference throughout the specification will be made to the vehicle as being  
5 a truck, although it should be appreciated that the present invention can have applications to other vehicle types, for instance trailers and the like.

Presently, there are three main categories of trucks. The first category are standard trucks which have fixed support surfaces such as decks with respect to chassis. The second category are tip trucks, that is trucks that  
10 have decks, one end of which is pivoted and the other end which moves vertically to tilt the deck upwards of 38° allowing loose material on the deck to be tipped off from the truck. These types of trucks require a clearance between the deck and ground when tipping. The third category is vehicle  
15 recovery trucks in which the deck of the truck is slid along to the rear of the truck and then as a result of the force of the gravity the deck is tilted so that the deck touches the ground. With this third category, the deck is positioned such that vehicles can be driven or pulled onto the sloping truck deck which is then slid into a horizontal position for transport of the vehicles.

20 There are many situations where it would be desirable to have a truck which can incorporate the tipping feature of category two trucks and the sliding and tilting facility of the category three trucks. Category three trucks cannot be used for standard tipping procedures as can category two trucks. This is because the decks on category three trucks need to  
25 overhang the back of the truck so it can be tilted by gravity. The overhang required is unsuitable for tipping material off the truck deck as in most

cases clearance between the deck and the ground is required when unloading material.

As the category three truck cannot be readily used for tipping, it is necessary for at least two separate vehicles to be provided to perform the different tasks of loading onto a sloped deck and tipping. Provision of different vehicles for each of these tasks can be considerably expensive, particularly when the owners of the trucks are local bodies, power departments and so forth who generally require a fleet of vehicles. Not only is the doubling up on vehicles expensive but the cost in labour to run the two separate vehicles is also expensive.

It is an object of the present invention to address the above problems, or at least to provide the public with a useful choice.

Further objects and advantages of the present invention will become apparent from the following description which is given by way of example.

According to one aspect of the present invention there is provided a vehicle including positioning means to alter the position of a vehicle support surface with respect to the main body of the vehicle, said positioning means including means which provide a positive action to lift at least part of the support surface with respect to the main body of the vehicle and translational means which allows the support surface to be moved with respect to the vehicle.

For ease of description the first support surface mentioned above shall be referred to as a deck, although the invention may be applied to other support surfaces. In some embodiments of the present invention, the deck may also include sides and tailgates both of which may either be fixed or removable.

It can be seen that the present invention overcomes many of the problems associated with previous devices. By having means to positively lift the deck with respect to the truck, there is no requirement for the deck to overhang the end of the truck chassis in order to be able to tip as a result of gravity.

It is possible with the present invention to have no overhang, however it is envisaged that in many embodiments, there may be overhangs of up to one metre beyond the end of the vehicle chassis. By having a lesser overhang, the angle at which the deck can be tipped can be sufficient for the deck to act as a tip truck. For example, it is preferred that the deck can tip at an angle of  $38^\circ$  or greater (preferably  $45^\circ$ ) which enables material on the deck to readily slide off same. Typical category three trucks can only tip to a maximum of  $25^\circ$  so it can be seen that the present invention provides considerable advantages.

A further advantage is that having the deck being able to be moved by separate translational means, the deck can be slid to ground allowing it to be used as a ramp in addition to being used as a tip truck.

The present invention may be achieved in a variety of ways. For instance, the deck of the truck may be connected to channels which can slide over a subframe on the truck. The positive lifting means to tilt the deck may be situated on the truck chassis frame and also be connected to the subframe. Operating the lifting means so it pushes upwards against the subframe, causes the subframe, the channels and the deck to all move upwards about a pivot point on the vehicle chassis. This provides a tipping motion, yet there is clearance between the end of the deck and the ground as an overhang of the deck is not required to provide the tipping motion.



For ease of description, the means by which the deck and subframe move will now be referred to as rams, however it should be appreciated as discussed above that other means may be used. The positioning of the rams with respect to the truck chassis and frame is preferably positioned  
5 and angled so that as the subframe is lowered with respect to the chassis, the end of the ram can be accommodated into the base of the truck and does not extend so that it is likely to touch the ground either when the truck is stationary or when travelling over rough ground.

In preferred embodiments, the positive lifting means is a double acting  
10 ram. To provide sufficient tipping motion, it is envisaged that a fairly long stroke of the ram is required, say between 100 and 200 centimetres. So that there is sufficient ground clearance with this length of stroke, the applicant has in preferred embodiments positioned the ram so that it is a relatively shallow angle to the vehicle chassis, say in the order of between  
15 20° and 40°. With the ram at this angle, considerable bending moment is imparted to the truck chassis and it is envisaged that side plates on which the ram is mounted will be of sufficient strength and of an appropriate shape to absorb these bending moments.

In other embodiments different stroke lengths and angles may be  
20 employed to enable the deck to be lifted to greater than 38°.

In some embodiments multi-stage double acting rams may be used.

In the above embodiment, translational movement of the deck may be achieved by having translational movement means connected between the subframe and the deck. Operation of this means can push the deck and  
25 the channels out from the subframe and slide the deck towards the ground. This translational movement may be effected either when the

subframe is tipped with respect to the truck or positioned substantially horizontal with respect to same.

It can be seen that by providing means to enable a single vehicle to both tip with sufficient clearance, yet also have a deck that can act as a ramp,  
5 many problems associated with the prior art have been overcome. It is now possible for only a single machine to be brought to perform the two tasks which is a saving in plant costs. Furthermore, it is much easier to transport a single machine to a site than to make arrangements for two machines to be transported. Also, the present invention enables labour  
10 costs to be halved.

In preferred embodiments of the present invention, the controls of the positioning means can be from the inside of the cab of the vehicle. Further, there may be also controls from the outside of the cab for user-friendly reasons and safety. In embodiments of the present invention that have a  
15 tailgate, the tailgate may be removable or may swing away and can be used for tipping and spreading purposes. The action for tipping the tailgate may also be controlled from inside the cab. In some embodiments it is preferable for the tailgate to be totally removable for loading and unloading machinery and so forth.

20 There may be provided a swing-away or telescopic support situated behind the rear wheels of the vehicle which bring the tipping line further under the load when the deck is slid out from the main body of the chassis and machinery is being loaded or unloaded. This support may then be swung forward for lifted of the like to give sufficient ground clearance for  
25 travelling.

The tilting and translational movement of the deck may be achieved in other ways from that described above. In an alternative aspect of the present invention, the subframe may be covered in a similar manner to the deck so that pushing the deck out from the subframe effectively provides  
5 an extended surface to the truck deck comprising the surface area of the original truck deck plus the surface area of the subframe.

In yet another embodiment of the present invention, the deck may be able to be tilted upwards and ramps slid from under the deck (or possibly over the deck) to touch the ground allowing a vehicle or other device to be driven  
10 up the ramps and onto the deck. For this embodiment, there is potentially less strain on the truck as the deck itself which is supporting the heavy weight of the vehicle does not have to be pulled back onto the truck chassis as much as if the whole deck had been slid to touch the ground instead of the ramps.

15 Some embodiments may have incorporated into them a stand attached to the back of the subframe which can be lowered to touch the ground when the deck is likewise lowered. This stand may be configured to take the weight of the loaded deck as it is sliding back up onto the chassis.

The means by which the deck and subframe is moved may be a variety of  
20 means, perhaps electric motors, threaded screws and so forth. In a preferred embodiment, double acting hydraulic rams are used as these can be connected readily into the hydraulic system of the truck and provide positive action in both directions. It should be noted that in previous tip trucks only single acting rams were used as the weight of material on the  
25 deck of the trucks bore down on the ram closing it up when the ram is released. In preferred embodiments, more positive control is desired

which is why double acting rams are proposed. Double acting rams can positively pull the deck back onto the truck body.

The present invention can be used for activities other than just tipping or providing a ramp. For instance, if a truck gets into difficulties as often happens on construction sites and the like, the sliding deck can actually be used to lift the truck by pushing against the ground.

The present invention also has a feature which makes it particularly versatile. As the support surface is connected to channels which can slide over sub-frames, it may be possible to remove the support surface from the vehicle and substitute another body which has channels that can also be slid over the subframe. For example, some bodies which can be attached to a vehicle using the aforementioned method may include a standard tipper, long flat deck, fifth wheel turn-table for tractor unit, a deck with a fixed truck mounted crane, a water tank or tanker body, a van body and so forth. This can be readily achieved by fitting a support means (perhaps in the form of a leg) to the support surface which enables the vehicle to unload the support surface onto the ground and pick up another body (with a similar support means) to be used for a different function.

Aspects of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figures 1a, 1b, 1c, 1d & 1e: are diagrammatic representations of possible configurations of the present invention, and

Figure 2: is a diagrammatic perspective view illustrating the relationship of the deck, channel and subframe to each other, and

Figure 3: is a diagrammatic side view illustrating the positioning of various components on the vehicle.

With respect to Figures 1a to 1e, there is illustrated a truck generally indicated by arrow 1 with a cab 2, chassis 3, said truck 1 incorporating the present invention.

Figure 1a illustrates the truck 1 configured for normal transportation. A deck 4 is welded onto a channel 5 which sits horizontally on the chassis 3. Just underneath the channels 5 can be seen the subframe 7. The front upright portion 6 of the deck 4 sits against the rear of the cab 2.

Figure 1b illustrated one use of the present invention whereby the deck 4 along with the channels 5 and subframe 7 has been tilted with respect to the truck 1. The angle of the tilt is at least 45 degrees to the vertical. The subframe 7 is connected by a hinge pin 8 to the chassis 3 of the truck 1. A ram 9 is connected between the subframe 7 and the chassis 3 and acts to push the subframe along with the attached channels and deck upwards as shown.

Figure 1c illustrates how the deck 4 and channels 5 can be slidably moved with respect to the subframe 7. To achieve this, a ram (not shown) is connected between the deck and the subframe. In other embodiments, the ram may be connected differently perhaps between the channels 5 and the subframe 1. It is this ram which allows translational movement of the deck 4 with respect to the truck 1.

Figure 1d illustrates an alternative method by which the present invention can be used wherein the subframe 7 remains in its normally horizontal

position with respect to the chassis 3 and the deck 4 along with channels 5 slide out from the rear of the truck 1 with respect to the subframe 7.

Figure 1 illustrates an alternative embodiment of the present invention wherein the deck is tilted by the ram 9. To obtain an effective extension of the deck and provide a ramp, the deck 4 remains substantially stationary and instead ramps 10 are slid out from channels underneath the deck 4. This effectively extends the length of the deck 4 and provides a ramp 10 onto which vehicles can drive to obtain access to the deck 4.

With reference to Figure 2, the relationship of the deck 4, the channels 5 and the subframe 7 can be more clearly seen. The channels 5 are attached to the deck 4 perhaps by welding. The subframe 7 forms a slidable fit with the channels 5. A ram illustrated by the dotted outline 11 is attached to the middle of the deck 4 and to the end of the subframe 7. Extending and shortening the ram 11 causes the deck 4 and channels 5 to remove with respect to the subframe 7. In other embodiments, the ram 11 may be attached to the channels 5 instead of the deck 4.

Figure 3 is a side view of a vehicle in accordance with one embodiment of the present invention.

The vehicle 21 comprises of a cab 22 and a rear deck generally indicated by arrow 23. The deck 23 has sides 24 and a tailgate 25. Beneath the deck 23 is the chassis frame 26. A double acting ram 27 is attached to a side plate 28 connected to the chassis 26. The other end of the ram 27 is attached to the subframe (not shown) onto which the deck 23 is connected.

The subframe (not shown) pivots about pivot point 29 on the chassis 26.

There are two important dimensions that should be noted when viewing Figure 3. The first is the small amount of overhang between the end of the deck 24 and the rear hinge 29 which in this embodiment is approximately 15cm. The second dimension to note is the angle of the ram 27 with respect to the chassis which is between 20° and 40°. It can be seen from the lengths of the ram that it is necessary to place it on this angle to achieve the required lift on the deck so that it can tip like in excess of 38° and still provide sufficient ground clearance.

Aspects of the present invention have been described by way of example only and modifications and additions may be made thereto without departing from the scope of the appended claims.

## **CLAIMS**

1. A vehicle including positioning means to alter the position of a vehicle support surface with respect to the main body of the vehicle, said positioning means including means which provide a positive action to lift at least part of the support surface with respect to the main body of the vehicle and translational means which allows the support surface to be moved with respect to the vehicle.
2. A vehicle including positioning means as claimed in claim 1 wherein the support surface is connected to channels which can slide over a sub-frame positioned on the vehicle.
3. A vehicle including positioning means as claimed in claim 2 wherein the positive lifting means is situated on the vehicle chassis and is also connected to the sub-frame.
4. A vehicle including positioning means as claimed in claim 3 wherein operation of the lifting means is such that the lifting means pushes against the sub-frame and causes the sub-frame, the channels and the support surface to move upwards about a pivot point on the vehicle chassis.
5. A vehicle including positioning means as claimed in any one of claims 1 to 4 wherein translational movement of the support surface is achieved by having translational means connected between the sub-frame and the vehicle support surface.
6. A vehicle including positioning means as claimed in any one of claims 1 to 5 wherein the positive lifting means is in the form of a double acting ram.



7. A vehicle including positioning means as claimed in any one of the claims 1 to 6 wherein the support surface can be slid out from the sub-frame.
8. A vehicle including positioning means as claimed in any one of the claims 1 to 7 wherein a ramp is slid from under or from over the support surface.
9. A vehicle including positioning means as claimed in any one of the claims 2 to 8 wherein there is provided a stand to support the sub-frame.
10. A vehicle including positioning means as claimed in any one of claims 1 to 9 where it is possible for the support surface to be removed from the support frame and an additional body substituted therefor.
11. A vehicle including positioning means as claimed in any one of claims 1 to 10 wherein the positive lifting means is positioned at an angle of between 20° and 40° with respect to the plane of the vehicle chassis.
12. A vehicle including positioning means as claimed in any one of the claims 1 to 11 wherein the vehicle has a rear overhang from the pivot point which is no more than one metre.
13. A vehicle including positioning means as claimed in any one of claims 1 to 12 wherein there are provided sides which are fitted alongside the support surface.
14. A vehicle including positioning means as claimed in any one of the claims 1 to 13 wherein there is provided a tailgate which is fitted alongside the rear of the support surface.
15. A vehicle including positioning means as claimed in any one of the claims 1 to 14 wherein there is provided means to control the action of the positioning means from within the cab of the vehicle.

16. A vehicle including positioning means substantially as herein described with reference to and as illustrated by the accompanying drawings.

Patents Act 1977

Examiner's report to the Comptroller under  
Section 17 (The Search Report)

Application number

GB 9218265.8

Relevant Technical fields

(i) UK Cl (Edition 1) B8E (E1C)

(ii) Int Cl (Edition 5) B60P 1/30, 1/32, 1/34

Search Examiner

D MCMUNN

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

16 DECEMBER 1992

Documents considered relevant following a search in respect of claims

1-16

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1489654 (MARVEL)	1 at least
X	GB 1409758 (KOU)	1 at least
X	GB 965975 (NELSON)	1-6 at least
X	GB 463907 (WRIGHT)	1-6 at least
X	GB 374709 (ALEXANDER)	1 at least
X	GB 349398 (EDWARDS)	1 at least
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